

Application Number 10/533489
Response to the Office Action mailed March 23, 2009

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Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1. (Currently Amended) A chip resistor comprising:

a chip resistor body made of a metal and having a front surface, a rear surface provided at an interval in a thickness direction, a pair of side surfaces extending in a length direction at an interval in a width direction, and a pair of end surfaces provided at an interval in the length direction;

a plurality of electrodes provided in series on the rear surface of the resistor body at intervals in the length direction, the plurality of electrodes being formed by plating;

a metal coating layer covering a respective one of the electrodes and a respective one of the end surfaces;

a first insulation layer covering a region between the plurality of electrodes on the rear surface of the resistor body; and

a second insulation layer covering the pair of side surfaces of the resistor body; and

a third insulation layer covering the front surface of the resistor body;

wherein each of the electrodes and the metal coating layer overlap a portion of the first insulation layer, said portion of the first insulation layer being held in direct contact with the rear surface of the resistor body and inserted between the metal coating layer and the rear surface of the resistor body, the metal coating layer extending beyond the respective electrode into direct contact with the first insulation layer,

wherein the plurality of electrodes comprises two or more pairs of electrodes.

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2. (Canceled)

3. (Currently Amended) The chip resistor according to claim 1[[2]], wherein at least two of the first through third insulation layers are made of an identical material.

4. (Currently Amended) The chip resistor according to claim 1[[2]], wherein each of the electrodes has a greater thickness than the first insulation layer.

5. (Canceled)

6. (Previously Presented) The chip resistor according to claim 1, wherein the metal coating layer comprises a solder layer.

7. (Previously Presented) The chip resistor according to claim 1, wherein each of the electrodes is spaced from a respective end surface of the resistor body in the length direction.

8. (Previously Presented) A manufacturing method for chip resistors each of which comprises:

a chip resistor body having a front surface, a rear surface provided at an interval in a thickness direction, a pair of side surfaces extending in a length direction at an interval in a width direction, and a pair of end surfaces provided at an interval in the length direction;

a plurality of electrodes provided in a series on the rear surface of the resistor body at intervals in the length direction;

a metal coating layer covering a respective one of the electrodes and a respective one of the end surfaces;

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a first insulation layer covering a region between the plurality of electrodes on the rear surface of the resistor body; and

a second insulation layer covering a pair of side surfaces of the resistor body;

wherein each of the electrodes and the metal coating layer overlap a portion of the first insulation layer, said portion of the first insulation layer being inserted between the metal coating layer and the rear surface of the resistor body, the metal coating layer extending beyond the respective electrode into direct contact with the first insulation layer,

the method comprising the steps of:

producing a resistor aggregate shaped into a bar, the resistor aggregate made of a metal and having a rear face provided with a multiplicity of electrodes, the multiplicity of electrodes being formed by plating and arranged at intervals in a longitudinal direction of the resistor aggregate, regions between the multiplicity of electrodes on the rear face are covered with a first insulation layer, the resistor aggregate having a pair of side surfaces covered with a second insulation layer; and

dividing the resistor aggregate into a plurality of chip resistors by cutting the resistor aggregate at a plurality of locations in the longitudinal direction of the resistor aggregate.

9. (Previously Presented) The manufacturing method according to claim 8,

wherein the step of producing the resistor aggregate comprises the steps of:

providing a pattern-formed insulation layer and a conductive layer serving as the electrodes on one surface of a resistor material plate;

dividing the resistor material plate into a plurality of resistor aggregates;

and

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forming an insulation layer on the pair of side surfaces of each resistor aggregate.

10. (Previously Presented) The manufacturing method according to claim 8, wherein the step of producing the resistor aggregate comprises the steps of:

pattern-forming an insulation layer on one surface of a resistor material plate;

dividing the resistor material plate into a plurality of resistor aggregates; and

forming an insulation layer on the pair of side faces of each of the resistor aggregates;

forming the multiplicity of electrodes on the rear face of the resistor aggregate.

11. (Previously Presented) The manufacturing method according to claim 8, further comprising the step of forming a third insulation layer covering a front surface of the resistor aggregate prior to dividing the resistor aggregate into the plurality of chip resistors.

12. (Previously Presented) A manufacturing method for chip resistors each of which comprises:

a chip resistor body having a front surface, a rear surface provided at an interval in a thickness direction, a pair of side surfaces extending in a length direction at an interval in a width direction, and a pair of end surfaces provided at an interval in the length direction;

a plurality of electrodes provided in a series in the rear surface of the resistor body at intervals in the length direction;

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a metal coating layer covering a respective one of the electrodes and a respective one of the end surfaces;

a first insulation layer covering a region between the plurality of electrodes on the rear surface of the resistor body; and

a second insulation layer covering the pair of side surfaces of the resistor body;

wherein each of the electrodes and the metal coating layer overlap a portion of the first insulation layer, said portion of the first insulation layer being inserted between the metal coating layer and the rear surface of the resistor body, the metal coating layer extending beyond the respective electrode into direct contact with the first insulation layer,

the method comprising the steps of:

producing a resistor aggregate shaped into a bar, the resistor aggregate made of a metal and having a rear face provided with a multiplicity of electrodes, the multiplicity of electrodes being formed by plating and arranged at intervals in a longitudinal direction of the resistor aggregate between the multiplicity of electrodes on the rear face covered with a first insulation layer;

dividing the resistor aggregate into a plurality of chip resistors by cutting the resistor aggregate at a plurality of locations in a longitudinal direction of the resistor aggregate, each of the chip resistors having side surfaces; and

forming a second insulation layer on the side surfaces of each of the chip resistors.

13. (Previously Presented) A manufacturing method for chip resistors each of which comprises,

a chip resistor body having a front surface, a rear surface provided at an interval in a thickness direction, a pair of side surfaces extending at a length

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direction at an interval in a width direction, and a pair of end surfaces provided at an interval in the length direction;

a plurality of electrodes provided in a series on the rear surface of the resistor body at intervals in the length direction;

a metal coating layer covering a respective one of the electrodes and a respective one of the end surfaces;

a first insulation layer covering a region between the plurality of electrodes on the rear surface of the resistor body; and

a second insulation layer covering the pair of side surfaces of the resistor body;

wherein each of the electrodes and the metal coating layer overlap a portion of the first insulation layer, said portion of the first insulation layer being inserted between the metal coating layer and the rear surface of the resistor body, the metal coating layer extending beyond the respective electrode into direct contact with the first insulation layer,

the method comprising the steps of:

preparing a frame of a conductive material comprising a plurality of bar portions extending in a predetermined direction, each bar portion made of a metal and having a front surface, a rear surface, and a pair of side surfaces, the frame also comprising a support portion for supporting the plurality of bar portions;

producing a plurality of resistor aggregates by forming, on the rear surface of each of the bar portions, a multiplicity of electrodes by plating, the multiplicity of electrodes being arranged at intervals in the predetermined direction and a first insulation layer positioned in regions between the plurality of electrodes, followed by forming a second insulation layer on the pair of side surfaces of each of the bar portions; and

dividing each of the resistor aggregates into a plurality of chip resistors.

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14. (Previously Presented) The manufacturing method according to claim 13, wherein the step of forming a second insulation layer on the pair of side surfaces of each of the bar portions is performed after rotating the bar portions about a longitudinal axis extending in a predetermined direction by twisting a connecting portion between the bar portion and the support portion of the frame.

15. (Previously Presented) The manufacturing method according to claim 14, wherein the connecting portion of the frame is narrower than each bar portion.

16. (Previously Presented) The manufacturing method according to claim 13, further comprising a step of forming the third insulation layer on the front surface of each of the bar portions before dividing each of the resistor aggregates into the plurality of chip resistors.

17. (Previously Presented) The manufacturing method according to claim 16, wherein the step of producing the resistor aggregates comprises forming the multiplicity of electrodes by plating after forming the first through third insulation layers on each of the bar portions.

18 - 33. (Canceled)

34. (Currently Amended) ~~The chip resistor according to claim 1,~~ A chip resistor comprising:

a chip resistor body made of a metal and having a front surface, a rear surface provided at an interval in a thickness direction, a pair of side surfaces extending in a length direction at an interval in a width direction, and a pair of end surfaces provided at an interval in the length direction;

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a plurality of electrodes provided in a series on the rear surface of the resistor body at intervals in the length direction, the plurality of electrodes being formed by plating;

a metal coating layer covering a respective one of the electrodes and a respective one of the end surfaces;

a first insulation layer covering a region between the plurality of electrodes on the rear surface of the resistor body; and

a second insulation layer covering the pair of side surfaces of the resistor body;

wherein each of the electrodes and the metal coating layer overlap a portion of the first insulation layer, said portion of the first insulation layer being held in direct contact with the rear surface of the resistor body and inserted between the metal coating layer and the rear surface of the resistor body, the metal coating layer extending beyond the respective electrode into direct contact with the first insulation layer,

wherein each of the plurality of electrodes is held in direct contact with the rear surface of the resistor body.